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ABSTRACT

The Multi-Digit (MDT) testing procedure is a computer-scored testing innovation conceptualized in 1982. It is fully compatible with multiple choice and true/false tests well suited for the testing of discreet terms and concepts such as in fill-in-the-blank examinations. The student reads the question and selects the appropriate response from an alphabetically organized, lengthy list on which each term is numbered. With three-digit numbers, there can be up to 999 items on a list, far too many for any student to peruse in an attempt to recognize the correct answer. The student is required to recall the correct answer, locate it on the alphabetical list and then place the code number on the computer readable answer sheet. The paper explains how to use MDT in teaching and evaluating an Introduction to Criminal Justice course. A sample MDT test and actual MDT lists for major clinical justice terms and concepts are appended. (Author/JAZ)



MULTI-DIGIT (MDT) TESTING IN THE TEACHING OF CRIMINAL JUSTICE SCIENCES

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ABSTRACT

The Multi-Digit (MDT) testing procedure is a new addition to computer scored testing and is fully compatible with multiple choice and true/false tests. It is especially well suited for the testing of discreet terms and concepts such as in fill-in-the blank examinations. The student reads the question and selects the appropriate response from an alphabetically organized, lengthy list on which each term is numbered. With three-digit numbers, there can be up to 999 items on a list, far too many for any student to peruse in an attempt to recognize the correct answer. The student is required to recall the correct answer, locate it on the alphabetical list and then place the code number on the computer readable answer sheet. Actual MDT lists for major Criminal Justice terms and concepts are provided in this paper which also explains how to put the Multi-Digit testing innovation into immediate practical use for the teaching of the Introduction to Criminal Justice courses on any campus.

A presentation to the Annual Meeting of the Academy of Criminal Justice Sciences, Orlando, Florida, 17-21 March 1986.

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INTRODUCTION

Teaching a course on the Introduction to Criminal Justice Sciences requires a variety of evaluation techniques in order to assess the students' learning in the various components of that course. The higher order forms of learning which require synthesis and evaluation by the students are traditionally tested with essay tests or single paragraph answers. Important as that element of testing is, essays are not the best method for determining if the students have mastered the basic factual information which is essential for anyone to have a firm grasp on the topic of Criminal Justice Sciences. To determine that knowledge professors commonly utilize multiple choice or fill-in-the-blank tests. The multiple choice method has the obvious disadvantage of encouraging recognition, the elimination of alternatives, and outright guessing. It is hard to imagine that someone would not pick out the term from a selection of five names. Furthermore, the onus is on the professor to devise the four wrong answers (foils) that are supposed to have a reasonable likelihood of being selected if the student does not recognize the correct answer. The result is that students frequently avoid the full learning of essential factual information in a course, whether introductory or at an advanced level, because they are good at recognition and the elimination of foils.

It is much more difficult to <u>recall</u> from memory and write down specific answers. Recall requires that the information be learned better. Therefore, considering that some of that factual information should become part of the basic knowledge of an educated person, professors sometimes opt for tests where one or



two word answers must be written. The questions are actually easier to write than those of a multiple choice test because no alternative answers are required. The major difficulty with such fill-in-the-blank style tests is that the professor must be willing to devote significant time to their grading, especially if mastery learning is desired. What would be useful is a computer scored fill-in-the-blank style test of terms and concepts about Criminal Justice Sciences that could be quickly generated and graded, complete with statistical analyses. Then the essential learning can be required and tested while freeing the professor for essay scoring, student advisement, research and other activities more productive than manual test scoring.

The Multi-Digit (MDT) testing innovation is a computer scored approximation of a fill-in-the-blank test. It is ideally suited for the evaluation (and stimulation) of learning of the factual information essential to a course such as the Introduction to Criminal Justice Sciences. Not only does it make the test scoring faster, it also makes the formulation of the test questions extremely easy and, according to recent research discussed in the next section, contributes to improved student learning during the semester and greater retention even after the conclusion of the course. With fast computer scoring of quickly generated tests which require student recall rather than recognition, a professor can more easily specify the level of competence required from the students. In that way, any student who does not meet that minimum requirement can be given additional tests until that requirement is met. The MDT materials included in the appendix of this paper permit such a

learning requirement to be specified by the professor in a course on Criminal Justice Sciences.

The Multi-Digit method requires the student to select the desired answer from very long lists of alternative responsess. In the answer sheet format shown in the appendix, the three-digit responses mean that up to 999 alternative answers can be on a single list. (Two-digit and four-digit versions are being developed.) Those lists of responses need only be prepared once or maybe revised at the beginning of each course. In the case of Introduction to Criminal Justice Sciences, the initial long lists that could be used by any professor are provided in the appendices of this paper; they are sufficient for literally thousands of questions. In other words, there is no need for the professor to be concerned with the incorrect alternative answers if the correct term for a given question is found on one of the lists. There are many ways of phrasing questions which would utilize these long lists of answers. Furthermore, the MDT innovation will accomodate numeric answers of three digits.

BACKGROUND AND RESEARCH

The Multi-Digit long list testing method was first conceptualized in the fall of 1982 by Dr. Anderson, co-author of this paper. It has subsequently been used for seven consecutive semesters with over 700 students in a course on World Regional Geography. It is currently being used in the disciplines of home economics, art appreciation, methematics, history, military science, English, political science, earth science, computer programming and chemistry. Instructors have created lists for



their subject matter and have used it in the classroom with several thousand university students. In addition, the largest single course to use the method has 1200 criminal justice students this semester, under the coordination of Diane Alexander, a co-author of this paper.

Because of the almost complete elimination of guessing on the Multi-Digit method in comparison to traditional multiple choice tests, the students' scores may be generally lower on an MDT test. There may also be a wider spread from the very lowest score to the highest score attained by students. Both of those characteristics can be advantageous to the professor. The traditionally accepted percentages of 90% and above being an A should not be applied to the MDT testing situations unless the professor intentionally modifies the examination material so that there are sufficient easy questions to allow the attainment of the specified percentages. In all cases, the individual professor remains independent and in charge of his or her particular class.

One of the key questions in evaluating this new testing technique concerns whether the students learned and retained more than they would have if studying for a traditional multiple choice test. Exploratory research conducted by Anderson, Hill, Naim and Walters (1985a) with nearly 200 students enrolled in World Geography, revealed that students who study for a fill-in-the-blank test or a Multi-Digit long list test retain more of their learning at the end of the semester than do students who studied the same material for a multiple choice test with five



alternative answers. These results are exactly as hypothesized. Furthermore, when students gain more familiarity with the MDT method, their results are expected to become even more similar to the greater learning and retention of the fill-in-the-blank method.

MDT Test Construction

Lists of terms preferably for the entire course should be constructed prior to the first test using the MDT format. The lists (see appendix) can be divided into different subject areas such as terms and concepts, names, amendments, places, court cases, professional organizations and agencies. The subject areas with few terms should be grouped together to increase the requirement of recall and reduce recognition. All of these lists could be combined into one. Sample lists for textbooks by Cole and Inciardi are attached to this paper.

Terms for the lists may be pooled from numerous sources, including glossaries and indexes. Terms from personal notes should also be included to cover specific lecture material. As a final resource, student study guides and instructor's manuals usually list key terms and concepts.

Test questions using responses on the MDT list need to be constructed with some caution. Questions should not have multiple possible answers on the list. An example, if the terms law enforcement and police are both on the list, there could be two correct answers for hastily prepared questions. The development of questions also involves a consciousness of the time required to answer the test because of the extra sheet of paper plus more marks to fill in. Students generally take

slightly longer to answer this style of questions. However, fewer questions are needed because of the increased academic rigor of recall. A short demonstration test early in the semester will provide the students with an in-depth understanding of the MDT answer format method to alleviate "test anxiety" and mental blocks caused by the promess of the testing procedure.

The pre-test also is an indicator to the students of the increased amount of studying time required to prepare for this test procedure.

Test Results

Computer programs for the grading of MDT tests provide subtotal scores for groups of questions and for each style of scores to be prepared on both the tests using MDT lists and any other format questions (ie: essay, MDT long list, multiple choice and true/false). This allows for the student to compare results and also detect weaknesses in study habits. Further computer generated results also indicate to the student their actual word answers as well as the correct answers because each term is in the computer under its code number. This feature helps the students clarify any misconceptions of the definitions or usage of description terms or concepts. Further explanations of the MDT method are in the book The MDT Educational Innovation (Anderson, 1936).

Conclusions

The use of MDT in Criminal Justice Sciences can be rewarding to the instructor as well as the student. In introductory courses, such as the one at ISU, this testing format reduces



cheating, facilitates question generation (although the lists can stay the same) so that tests can easily be changed from term to term, and provides an outlet for in-depth testing to instructors in both large lecture halls and small classrooms. Approximatley 1500 Introduction to Criminal Justice Sciences Courses students nave taken the test and admitted it is harder but it encourages better study skills and negates "all-nighters" performed the day before the test. There has been a substantial increase in the number of students taking advantage of seminars, small groups and test review since the change to this form of testing.

At Illinois State University, the students and faculty have found positive results from this testing, not only in the area of Criminal Justice but also in other disciplines. Upper level courses as well as introductory courses are able to provide the student with the educational benefits of a fill-in-the-blank test without the time of manual grading.

NOTE: The Multi-Digit Technologies (MDT) Corporation offers start-up assistance to any instructor wanting to use the MDT innovations. For further information, telephone 309-452-7072 or write to P.O. Box 14, Normal, Illinois 61761. MDT and Multi-Digit are trademarks of the MDT Corporation.



Demonstration M.D.T. Test [Use Cole List]

Terms & Concepts

Defendants who									of
imprisonment r	ot to	exceed	one y	year are	housed	in	(203)	•	

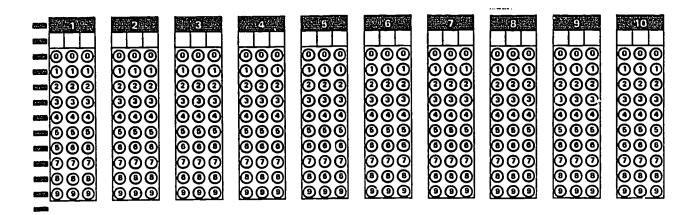
- 2. The individuals in Normal who have the power to arrest, ride around in cars with lights and sirens and wear a badge and gun are referred to as the Normal (256) Department.
- 3. Hinckley was relieved of his criminal responsibility for attempting to assassinate Ronald Reagan because of his accepted plea of __(197)__.
- 4. There are two categories of crimes, misdemeanor and ___(175)__.
- 5. The T.V. show, "The People's Court" involves informal processing of cases decided by a retired (204).
- 6. Miami (320) is a top-rated T.V. program which involves a realistic (ha! ha!) portrayal of detective work.

Names

7. The individual who researched the effectiveness of treatment programs and rehabilitation efforts and concluded with "nothing works" is (566) .

Amendments/Court Cases/Organizations/Places

- 8. This court has eight males and one female on it (782) .
- 9. The state which borders Illinois and is where the baseball team 'The St. Louis Cardinals" is from is __(755)__.
- 10. The freedom of religion, freedom of speech and the right to assemble are rights given to us in the Constitution under the (704) amendment.





COLE: Sample Questions

- 1. The large amount of plea bargaining which makes our court system similar to that of a revolving door, and the impersonality existing in some part of the criminal justice system has led to our system of justice being referred to as one of __(108)__ justice.
- 2. The chief law enforcement officers of a county are termed (298) .
- 3. The formalized definitions of offenses which specify all their characteristics is referred to (308) law.
- 4. Name the primary individual who believed that physical attributes and heredity were primary criminal behavior (561).
- 5. With few exceptions, police officers need a search warrant to search your house because of the rights granted by the ___(706)__ amendment.

INCIARDI: Sample Questions

- 1. Liability imposed on an employer for certain illegal acts of his employees committed during their employment is named (228).
- 2. The administrative record of an arrest is the (21) stage of the criminal justice process.
- 3. (34) involves legal action of one individual against another individual and is structured to regulate the rights between individuals or organizations.
- 4. The federal agency created to lead the "war on crime" and was a provision of the Omnibus Crime Control and Safe Streets Act is __(139)__.
- 5. In the court case (329), the United States Supreme Court reversed a lower court decision on the grounds that offenses such as "being addicted to the use of narcotics" were unconstitutional and that imprisonment for such an offense was cruel and unusual punishment in violation of the Eighth Amendment.

Figure 2A:

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(COLE) MDT LISTS for CRIMINAL JUSTICE

1 1-	RMS & CONCEPTS	<u>ل</u>	Female criminals Field interrogation Filtering process Fultering process Fult enforcement Fundamental fairness Furloughs General deterrence Good time Grand jury Grass seters Homicides Huber Act Incapacitation Indeterminate sentences Index crimes Index crimes Indictment Information Initial appearance Inmane code Insanity Intake Interrogation Investigation Irresistible Impulse Test Jaile Judge Judicial selection Jury Jury selection Jury Jury selection Jury Lawenile corrections Juvenile court Juvenile crime Juvenile court Juvenile crime Lamen (LEEP) Law Enforcement Education Frogram (LEEP) Law Enforcement Legal guilt Legal sufficiency Legalistic style Legal sufficiency Legalistic style Legal sufficiency Legal sufficiency Heals in se Mala prohibita Mandatory sentences Meat eaters Hene rea Minority police officers Miscouri Merit Selection Flan Murder Miccouri Merit Selection Flan Murder Mesouri Merit Selection Flan Murder Mesouri Merit Selection Flan Murder Monpartisan election Comibus Crime Control and		
A 101	Actual enforcement	17 17	/ Female criminals Field interrogation	253 254	Percentory challenge
103	Adjudication	17	Filtering process	255	Plea bargaining
104	Appeals	1-0	Full enforcement	256	Police
106	Accaionment	18	Purloughs	257 258	Police interrogation
107	YELASE	G 18	General deterrenca	259	Police organization
108	Assembly-line justice	180	Good time	260	Police women
110	Auburn system	18	Grass esters	262	Preliminary hearing
B 111	Bail	H 18	Homicide	263	Preplea conference
113	Bill of Rights Billsvchological	1 18	Huber Act Incapacitation	264	Presentence investigation
	explanations	190	Incarceration	266	Pretrial motions
114	Black judges	191	. Indeterminate sentences Index crimes	267	Pretrial processes
116	Bondsman	193	Indictment	26 9	Preventive Dation
117	Bureaucracy	194	Information	270	Prisoners' rights
	Case law	19:	Inmate code	271	Proactive
120	Challenge for cause	197	Insanity	273	Procedural criminal law
121	Child savers	198	Intake	274	Procedural due process
123	Clearance rate	200	Interrogation	2/5 276	Prosecuting accornay
124	Code of secrecy	203	Investigation	277	Public defender
125	Common law	202 1 203	: Irresistible Inpulse Test	278	Punishment
127	Community corrections	200	Judge	R 280	Reactive
128	Concensus model	20!	Judicial selection	281	Recidivian
130	Concept at a succession of a s	207	July July	282	Renabilitation Reintegration model
131	Conflict model	208	Jury selection	284	Release on recognizance
132	Constitutional	209	Jury trial		(ROR)
133	Copping out	211	Juvenile court	285 286	Resource dependence
134	Corrections	212	Juvenile crime	287	Restitution
135	Court	213 8/ 214	Juvenile justice Eansas City Personse Time	,288	Retribution
137	Courtroom workgroup	V	Analysis Study	290	Right to counsel
138	Courts of general	215	Labeling theory	S 291	Searches and seizures
139	Crime	L 214	Program (LEEP)	292	Santence Diaparity
140	Crime control model	217	Law enforcement	294	Sentencing council
141	Criminal instice meter	216	Legal quilt	295 296	Sentencing guidelines
143	Criminal responsibility	220	Legalistic style	297	Sentencing review
144	Criminal sanction	221	Legislative process	298	Sheriffe
146	Critical criminology	223	Low Visibility	300	Specific deterrence
147	Cruel and unusual	M 224	M' Naghten Rule	301	Stare decisis
148	punishment Custodial model	223 226	Mala in se Mala prohibita	302	State corrections
D 149	Deadly force	227	Mandatory sentences	304	Statutee
- 150 151	Death penalty	228	Mat eaters	305	Structural theory
152	Deinstitutionalization	230	Minority police officers	307	Substantial Capacity Test
153	Delinquent	231	Hiedemeanor	308	Substantive criminal 1 24
155	Determinate sentences	232	mimaguri marit Selection Plan	309	System erriciency Team policing
156	Deterrence	233	Murder	311	Total enforcement
157	DITTERNET(VI 'association theory	N. ^{23 4}	Necessarily included	312	Traffic .
158	Discovery	235	Heglected child	313 314	Trial proceedings
159	Discretion	236	Nolle prosequi	31%	Trial sufficiency
14.1 TQ0	Diversion Double jeopardy	237	Nolo contendere Nonpartisan election	n 375	U.S. Constitution Uniform Crime Reports
162	Dual court system	្រ ដូរ	Omnibus Crime Control and	318	Unresonable searches
103	nna btocasa	_	Sale Streets Act		and seliures
E 165	Durhem Rule Sighth Amendment		Order maintenance Organized crime	319 14 120	Opporworld crime
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167	Exchange relationships Exchange system	P 245	PINS/CINS/JINS	322	Victimless
169	Exclusionary rule	245	PINS/CINS/JINS Parens patrias Parole	323 324	Victimless Victimology. Visible crime
= 170	Pactual guilt Federal	2 46	Parole officer Partisan election	325	Vois dire
- 171 172	Pederal Pederal courte	247 248	Partisan election	W325	Voir dire Watchman style White-collar crime
173	Pederal prison system	249	Patrol Patrol function Penal code	328	Women prisonere
174	receral 182	250	Penal code	329	Women'à prisons
1/3	Palony Pemale corrections	251	Penitentiary Pennsylvania system	330	Work and educational release

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NAMES

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	580	Rubin, Jessa .
	581	Rubin, Ted
	582	Rubinstein, Jonathan
	563	Rush, Benjamin .
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	596	Tocqueville, Alexia de
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AMENDMENTS/COURTCASES/ ORGANIZATIONS/PLACES

A 701	APSCHE
702	Amendment, Eighth
703	Amendment, Fifth
704	Amendment, First
705	Amendment, Fourteenth
706	Amendment, Pourth
707	Amendment, Sixth
708	American Bar Association
709	American Judicature Society
710	American Prison
	Association
711	Appellate courts
712	Argerainger v. Hamlin
713	Attica Correctional
	Pacility
714	Attorney General's Task
	Force on Violent Crime
715	Auburn
₩ 716	Bell v. Wolfish
B 716 C 717 718	Carroll v. U.S.
- 718	Chimel v. California
719	Civilian review board
720	Community
721	Cooper v. Pate
722	Courts of first instance
723	Courta of general jurisdiction
_ 724	Criminal bas
D 725	Durham v. United States
F 726	Elmira
E 726	Elmira Reformatory
	England
729	Escobedo v. Illinois
730	Pederal Bureau of
F .30	Investigations

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731 Praternal Order of Police
732 Purman v. Georgia
Gagnon v. Scarpelli
734 Gideon v. Mainwright
735 Greet Britian
736 Gregg v. Georgia
1737 In re Gault
738 In re Winship
739 Intersat group
740 International Association
of Chiefs of Police
741 International Brothschood
of Police Officers
742 International Conference
of Police Associations
743 International Union of
Police Associations
744 Johnson v. Avery
745 Joliet
K 746 Kanses City
747 Kent v. U.S.
748 Knapp Commission
1749 LOY Enforcement
Assistance Admin.
M 750 Happ v. Ohio
751 HcKeiver v. Pennsylvania
752 Hempa v. Rhay
753 Hissouri
754 Hissouri
755 Horrissey v. Brewer
N 757 Nat'l Advisory Comm. on
Crim. Just. Standards
758 Nat'l Advisory Commission
On Civil Disorders
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759	Nat'l Comm. on Causes
	Prevention of Violence
760	Nat'l Council on Crime and Delinquency
761	National Census of Jails
762	National Crime Surveys
763	National Prison
	Association
764	New Mexico State Prison
765	PROMIS
766	Pennsylvania
767	Police Foundation
768	Police unions
769	Powell V. Alabama
770	President'a Commission
	on Law Enforcement
771	Procumier v. Martinez
772	Puritan Massachusetts
773	Rainfall West
2774	Sanothello v. New York
775	State courts
7776	Terry v. Obio
1777	U.S. Bureau of Prisions
9778	U.S. Bureau of Prisons
779	U.S. Bureau of the Census
780	U.S. Court of Appeals
781	U.S. District Courts
782	U.S. Supreme Court
783	U.S. V. Robinson
784	United States
W785	Wickersham Commission
786	Wincanton, U.S.A.
787 788	Wolff v. McDonnell
788	Woman police officers

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MDT LISTS for CRIMINAL JUSTICE

	M2	Accust enforcement Actus reus Adjudication Administrative lew Adversery eystem Allocution Appeal Appellate jurisdiction Arkansae prison esendal Atreignment Arroat pawers Arroan Assembly lime junties Auburn eysten Automatic reversal rule Beil Bill of righte Blue-tost crime Booking Bow etrest runners Bracking and entering Brutelity Burseucracy Burger court Burglery Capital punishment Carroll doctrine Case lew Chellenge for cause Child severs Civil deeth Civil lev Civilian review boards Classical ecb of crim. Classical ecb of crim. Classification Classerence rete Comm. besed corr. Commos lew Conjugal visitation Conspiracy Consider power Controlled substances ect Copping out Corporal punishment Counterfled substances ect Copping out Corporal punishment Counterfled substances ect Copping out Corporal punishment Counterfled substances ect Copping out Corporal punishment Counter of lest resert Courte of retord Crime clack Crime clack Crime control model Crime index Crime index Crime leck Crime control model Crime index Crime leck Crime leck Crime control model Crime index Crime leck Crime control model Crime index Crime leck Crime leck Crime control model Crime index Crime leck Crime leck Crime control model Crime index Crime index Crime control model Crime index Crime control model Crime index Crime in					1 04	Pantiago election
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	3	Adjudication	G	99	Good time		193	Penel code Pannevivania avatam
	4	Administrative law		100	Grand jury		197	Plein error ruls
	6	Allocution		102	Gua control		198	Plein view doctrine
	7	Appeal	Н	103	Habeas corpus		200	Polica buresucrecy
	•	Appellete jurisdiction	• • •	104	Habituml offender leve		201	Police corruption
	10	Atreignment .		106	Hermiece error rule		202	Police presence
	11	Arrest pewers		107	Homicide		204	Police role
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